THE FOOT MAGGOT, BOOPONUS INTONSUS ALDRICH, A NEW MYIASIS-PRODUCING FLY

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EIGHT PLATES

In the routine work of laboratory diagnosis on the cases in the clinic of the College of Veterinary Science of the University of the Philippines, a peculiar type of myiasis-producing fly was discovered. From clinic case 109 (carabao) a number of maggots were obtained which were strikingly different, both in appearance and in habit, from the other types of fly larvæ which had been previously observed. Adults raised from these maggots were forwarded to Dr. J. M. Aldrich, of the Smithsonian Institution, through Dr. L. O. Howard, chief of the Bureau of Entomology of the United States Department of Agriculture. Doctor Aldrich reported the fly to be a previously undescribed species, and one for which a new genus must be erected. It has since been described by him as *Booponus intonsus*.[1] Subsequent to the recognition of this distinct type of myiasis, several interesting cases have been treated in the clinic of the College of Veterinary Science, which have furnished excellent oportunities for a detailed study of this peculiar fly.

CASE REPORTS

1. Case 109, February 16, 1922.—Carabao, female. History of a previous attack in 1920 with maggots in the feet. Animal lame. All four feet affected. Foot maggots found in many of the puncture wounds. About one hundred taken from the four feet, the heaviest infestation in the hind feet.

Treatment.—Removed as many of the maggots as could be found and applied a chloroform pack to each foot for twenty-four hours. Eleven

[1] Antea, p. 141.

dead maggots found when pack was removed. Tar and sulphur ointment applied daily for three weeks. Skin wounds healed by that time, and the horn of the wall grown so that the holes that had been at the top were no longer in soft tissue. No more maggots being found treatment was discontinued and the animal kept under observation. Thirteen days later seventeen larvæ were found, one in each of the front legs and the rest in the hind legs. Same treatment as given before was given for two weeks and the case discharged as cured. A month later the animal was brought back to the clinic, having become reinfested. As the animal could not be left in the clinic, the maggots were removed and the caretaker was given a supply of tar ointment to apply daily.

2. Case 121, March 12, 1922.—Hereford, male. In hospital for myiasis of the external ear. Was kept in the same paddock with case 109. On April 1, 1922, the animal was observed to be lame in the left hind leg. Foot maggots found in the affected limb. At the juncture of the skin and horn a large larva was found half buried in a very small puncture wound.

Treatment.—Chloroform pack twenty-four hours, and daily application of the tar ointment for eight days. Animal completely recovered.

3. Case 146, April 2, 1922.—Hereford, male. Brought to the clinic with a history of lameness. Foot maggots found in the left hind foot.

Treatment.—Same as for case 121. Discharged as cured on April 8, 1922.

4. Case 182, May 15, 1922.—Hereford, male. Animal brought to the clinic with an abscess in the right flank. The feet were examined and four foot maggots found in the right hind foot.

Treatment.—An ointment made up of sulphur, 1; oil of tar, 2; sodium bicarbonate, 1; and wool fat, 8, was applied daily. Foot lesions cured in six days.

5. Case 220, June 24, 1922.—Hereford, female. Foot maggots found in all four feet.

Treatment.—Maggots removed and the ointment used in case 182 applied daily for three days. No treatment given the next two days. On June 29 a few small maggots were found in each of the four feet. Ointment again applied daily until July 4. Case discharged as cured on July 7, 1922.

6. Case 225, June 29, 1922.—Carabao, female. While inspecting the carabaos of the College of Agriculture for traces of previous infestations with foot maggots, one of the milking herd was discovered to be very restless and was sent to the clinic for examination. Many foot maggots were found in both hind feet.

Treatment.—Same as for case 182. The following day six small maggots were taken from the left hind foot, eight from the right hind foot, and one from the right front foot. Treatment continued, and no more maggots found. Case discharged July 4, 1922. Caretaker supplied with the ointment with instructions to apply daily. No reinfestation occurred.

7. Case 250, July 11, 1922.—Hereford, male. Brought to the clinic with a scrotal wound infested with screw-worm larvæ. Feet examined, and foot maggots found. Many eggs of the foot-maggot fly found attached to the hairs about the fetlock.

Treatment.—All maggots found were removed, and the hair was clipped short from the pasterns and fetlocks. Ointment as used for case 182

applied. Several dead larvæ removed the following day. Ointment then applied daily until July 18, when treatment was discontinued. Animal remained in the clinic until August 10, under observation, no recurrence of the condition taking place.

8. Case 251, July 11, 1922.—Hereford, male. History of lameness in the right hind leg, and larvæ in the foot. Had previously received treatment, consisting of chloroform pack and bandage. Two foot maggots found in the affected limb.

Treatment.—Same as for case 182. Discharged on July 13.

9. Case 252, July 11, 1922.—Hereford, male. History of lameness in left hind leg. A deep wound found ventral to the lateral claw of affected leg; also numerous puncture wounds at coronary band and at margins of claws of all four feet. More than one hundred foot maggots removed.

Treatment.—From the fetlock down the hair was cut short to remove fly eggs. Same ointment applied daily as in case 182. On the 16th a heavy application of pix liquidæ applied. No further treatment given. Animal under observation until August 1, with no reinfestation.

10. Case 259, July 13, 1922.—Hereford, male. History of lameness. Approximately eighty foot maggots and one screw-worm fly larva found.

Treatment.—Same as given to case 182. Discharged with feet in good condition on July 18.

11. Case 260, July 14, 1922.—Hereford, male. Brought to clinic with a wound in the prepuce infested with screw-worm larvæ. Feet found to be infested with foot maggots. Small puncture wounds present in the following numbers:

48 in coronary band, right hind foot, of which 27 were at bulbs of heels.
19 around lateral dew claw, right hind foot.
18 around medial dew claw, right hind foot.
57 in coronary band, left hind foot, of which 43 were at bulbs of heels.
22 around lateral dew claw, left hind foot.
21 around medial dew claw, left hind foot.
29 in coronary band, right front foot.
19 in coronary band, left front foot.

Treatment.—Maggots removed, hair closely clipped, and a heavy coating of pix liquidæ applied. Three days later the application was repeated. No further treatment. Animal under observation until August 5. No reinfestation.

12. Case 298, July 24, 1922.—Goat, male. Sent to clinic for castration. Animal lame in right front leg. One large foot maggot found burrowing into tissue at the lateral surface of the carpus. Foot maggots also found at the coronary band of the feet in the following numbers:

3 in left front foot.
2 in right front foot.
5 in left hind foot.
3 in right hind foot.

Treatment.—Same as for case 121. Foot lesions cured July 31, 1922.

13. Case 299, July 24, 1922.—Goat, male. Sent to clinic for castration. Twelve foot maggots found in feet. All four feet affected.

Treatment.—Same as for case 121. Foot lesions cured in eight days.

14. Case 302, July 24, 1922.—Hereford, male. Sent to clinic with *Otitis externus*. Fourteen foot maggots found; all four feet affected.

Treatment.—Same as for case 260. Foot lesions healed in seven days. Still under observation.

15. Case 318, July 26, 1922.—Hereford, male. In clinic for an abscess in right costal region. Foot maggots in left hind foot.

Treatment.—Same as for case 121. Foot lesions cured August 7.

16. Case 319, July 26, 1922.—Goat, female. Animal weak, depressed. Left front foot gangrenous as high as carpus. Heavily infested with screw-worm larvæ. A few foot maggots present.

Treatment.—Leg amputated above the carpus. Animal died shortly after operation.

17. Case 321, July 26, 1922.—Goat, female. Large gangrenous wound at the fetlock, right hind leg. Foot maggots and screw-worm larvæ present.

Treatment.—Necrotic tissue removed and a chloroform pack applied. Following day, treated with a 10 per cent silver nitrate solution, and from then on received ordinary wound treatment. Discharged as cured August 23.

18. Case 322, July 28, 1922.—Hereford, male. History of lameness. All four feet found infested with foot maggots:

4 at coronary band, left hind foot.
5 at lateral dew claw, right hind foot.
7 at bulbs of heels, right front foot.
2 at bulbs of heels, left front foot.

Treatment.—Chloroform pack, painted with pix liquidæ every third day until discharged as cured August 3.

19. Case 324, July 28, 1922.—Hereford, male. All four feet infested with foot maggots.

Treatment.—Maggots removed and pix liquidæ applied every other day until discharged as cured on August 3.

20. Case 361, August 10, 1922.—Goat, female. Large gangrenous wounds at fetlocks of both hind feet. The right foot had been disarticulated at the fetlock by the maggots. Foot maggots and screw-worm larvæ present. Animal died before treatment could be given.

BOOPONUS INTONSUS ALDRICH

LIFE HISTORY

Egg.—Elongate ovoid, with the anterior end somewhat pointed. Dull grayish white. Attached to the hairs of the host by means of a membrane formed by a gelatinous secretion of the female at the time of oviposition. Somewhat flattened on the side of attachment, the anterior or more-pointed end placed toward the base and closely applied to the hair. Smooth except for a band of small punctures on the outer or dorsal surface on the median line. Average measurements: Length, 0.875 millimeter; breadth, 0.229 (Plate 2, figs. 5 and 6).

Young larva.—The young larva resembles the full-grown larva, but differs in that the body spines are much darker and there are but two slits in each of the posterior stigmata (Plate 4, fig. 1).

Full-grown larva.—Body plump, robust, cylindrical; wedge-shaped when fully extended (Plate 1, figs. 1 and 4). Posterior

end rounded and invaginated, with one very small pair of tubercles dorsad, another pair ventrad, and a third pair laterоventrad of the stigmata (Plate 1, fig. 7). Body grayish white, lateral fusiform areas absent, ventral areas present. Body surface covered with irregular rows of short, stout, reclinate, pale brown spines (Plate 1, fig. 6). Head retracted into thorax when at rest, bilobed, with a pair of minute, sometimes faintly pigmented papillæ anteriorly and a brown chitinous comb ventrobasally on each lobe (Plate 1, fig. 8; Plate 3, fig. 1). Oral hooks two, toothed, dark brown to black, and recurved ventrally (Plate 2, fig. 2). Amphipneustic. Anterior spiracular projections swollen, with tubercular surface, trachea (visible through the projections) with 18-digitate extremities (Plate 1, fig. 5; Plate 3, fig. 1). Posterior stigmal plates on swollen hemispherical areas on the sides of the invaginated region of the posterior end of the last abdominal segment (Plate 1, fig. 7). Slits three, subparallel, with serrate edges (Plate 1, figs. 2 and 3; Plate 4, fig. 2). Length, 8.5 to 10 millimeters; breadth, 2.5 to 3.

Puparium.—Regularly ellipsoidal, rich chestnut brown to black (Plate 2, fig. 3). Surface finely rugose, with very short recumbent spines except for small bare areas along the segmental sutures which serve to accentuate the segmentation. Anterior spiracular projections protruding and tuberculous (Plate 2, fig. 4); posterior stigmal plates slightly swollen, black, with the same general appearance of the anal stigmata of the full-grown larva. Size variable, average length, 6 to 7 millimeters; breadth, 2.25 to 2.75.

Adult.—For description of the adult stage,[2] the reader is referred to the original description of Aldrich (antea, p. 141).

HABITS

Oviposition.—Occasionally the adults may be seen hovering around the legs of carabaos and bullocks. They alight on the lower portions of the leg and deposit their eggs on the hairs of the host. A gelatinous material secreted by the female at the time of oviposition serves to attach the egg to the hair (Plate 2, fig. 6). Almost invariably the eggs are placed head downward. As many as four eggs on one hair have been noted. More commonly only one egg is found on a single hair, and it is usually

[2] It is interesting to note that although some forty adults have been reared from the several different cases, only females have so far been obtained.

placed at about the middle. Eggs are deposited on the lower portions of the legs, principally between the toes and at the heel under the dew claws, less commonly up as high as the knee.

Hatching.—The young larva emerges from the egg by cutting a small circular flap on the dorsal surface of the anterior end of the egg (Plate 2, fig. 5). The incubation period varies considerably, possibly dependent upon certain stimuli which the egg may receive under conditions favorable for the young larva to become established in the host. Under laboratory conditions eggs hatched in from three to five days.

Young larva.—The young larvæ emerge from the egg headed toward the base of the hair. They work their way down the hair and then down the leg to the coronary band. Whether they attempt to enter the flesh at places other than that of the region of the coronary band is not known, but the presumption is that such is the case. In two cases, foot maggots have been found infesting regions other than that of the coronary band. Both of these were goats, animals whose skin is comparatively thin and tender. In these animals, both the coronary region and the knee were infested. In all other cases only the coronary region was involved. In all of the host animals, the tenderest part of the leg is the bulb of the heel, and the heaviest infestations are always found there. From these facts and from observations on newly hatched larvæ it seems safe to say that the larvæ attempt to enter the flesh at the point at which they happen to be when hatched, or they wander around searching until they find a place to enter or are brushed off or die. Because of the softness of the tissue of the coronary region, especially around the heel, the larvæ that survive and reach that region are able to enter and bury themselves in the flesh. Evidently the young larvæ enter the flesh before the third pair of slits is formed on the posterior stigmal plates, for no specimens with three pairs have been observed outside the tissue of the foot, and many that have but two pairs have been dug out of the flesh.

The maggots bury themselves in the tissue nearly parallel to the surface, leaving their posterior end exposed. The entrance holes are simple and small (Plate 7, figs. 1, 3, and 4), and once in the flesh the larvæ do not move around to any appreciable extent.

Full-grown larva.—The length of the larval period is not definitely known. From case histories and reinfestations, it appears that the period probably ranges from two to three weeks.

The full-grown larvæ leave the flesh and drop to the ground, where they bury themselves and pupate. The great variation in size of pupæ seems to be a direct result of the amount of available larval food. The pupal period is approximately ten days. The imago escapes from the pupa case by splitting the operculum, or cap, on the median line, and pushing the two halves aside as flaps.

OCCURRENCE AND ABUNDANCE

Adult.—The adult flies have not previously been observed. The genus and species were described from specimens reared from infested animals on the campus of the College of Agriculture at Los Baños, Laguna Province. Since the first breeding was made, a few adults have been observed depositing eggs on the feet of a carabao kept at the Forest School at Los Baños. No further records of its occurrence or abundance are extant, nor were specimens of the fly present in the collections of the College of Agriculture, the Bureau of Science, or the private collection of Prof. C. F. Baker, previous to its discovery. From the fact that the region around Los Baños is perhaps better known entomologically than any other in the Islands, it would appear that the fly is comparatively rare. Cases of myiasis produced by the maggots, however, tend to show that such is by no means the case.

Larva.—Twenty cases of myiasis caused by this fly subsequent to its recognition, have been recorded in the clinic of the College of Veterinary Science at Los Baños. Previous to that time there were undoubtedly other cases, but they were probably confused with myiasis produced by the screw worm, *Compsomyia dux* Eschscholtz, a very common and harmful pest of stock in the Philippines. The effects of infestations of the foot maggot are quite definite and distinctive. From these effects it has been possible to gather some data on the relative abundance of infestations. The college herds were examined, with the results indicated in Table 1.

TABLE 1.—*Showing incidence of foot-maggot infestations in the animals of the College of Agriculture.*

Hosts.	Positive.	Negative.
Work bullocks and Nellores	3	14
Milk animals (carabaos)	3	3
Carabaos	9	4
Herefords	12	3

Veterinary students reported the prevalence of the disease in the various barrios of Los Baños as shown in Table 2.

TABLE 2.—*Showing incidence of foot maggots among animals in Anos, Malaquing Bato, Maahas, and San Antonio Barrios.*

Hosts.	Positive.	Negative.	Attacked.
			P. ct.
Carabaos	13	11	54
Native cattle	5	36	12
Goats	0	8	0
Total	18	55	25

All of the Filipino farmers in different parts of Laguna Province, to whom foot-maggot cases or the characteristic after effects were shown, have stated that the condition is a rather common one and that often animals are laid up from lameness due to maggots, *uod,* in the feet.[3] From their descriptions of the infestations and from the fact that they recognized the hoof injuries resulting from such infestations, it is presumed that the cases at the College of Agriculture cannot be considered either unique or endemic. A further fact, brought out in conversations with owners of stock in Laguna Province, was that the number of cases was greatest in the dry season, and this checked with observations made by us on the college herds. This seasonal occurrence may be explained by the fact that during the wet season the animals spend a greater part of their time in mud and water. The mechanical action of the mud would tend to remove the larvæ and, perhaps, the eggs. The flies would also have greater difficulty in depositing the eggs. Actually, eggs are much more difficult to obtain in the rainy season. Further, Hereford cattle are much more susceptible to the attacks of the fly than are carabaos. Carabaos will wallow in mud at every opportunity, while Herefords are essentially dry-pasture animals. Still further evidence is offered in the case of the carabao owned by the Forest School of the Bureau of Forestry. This animal has had a continuous series of infestations throughout the dry season. No animal in the college herd has had a comparable amount of trouble from this pest. The Forest School carabao, however, never wallows in the mud, there being no facilities for this at the Forest School, while the college animals are pastured

[3] We are informed through Dr. Miguel Manresa, of the College of Veterinary Science, that there is a local word, *kayuko,* which refers to this particular myiasis. The use of the term appears to be quite local.

in fields with plenty of wallows and the animals can soak themselves at will.

HOST ANIMALS

So far only Bovidæ have been recorded as hosts. Maggot specimens have been obtained from Hereford, Nellore, and Philippine cattle, carabaos, and goats. Data available are not sufficient to allow the drawing of definite conclusions relative to the susceptibility of the various kinds of animals. However, in the vicinity of Los Baños the order of percentage of attack observed is: Hereford cattle, carabao, Philippine and Nellore cattle, goats.

DIFFERENTIATION BETWEEN SCREW WORMS AND FOOT MAGGOTS

The common screw worm of the Philippines, *Compsomyia dux*, differs from the foot maggot in several very obvious details. Because the former is the maggot most likely to be confused with the foot maggot, descriptions of the larval and pupal stages are included in this paper.

COMPSOMYIA DUX ESCHSCHOLTZ

Larva.—Body elongate, regularly tapering and wedge-shaped. Posterior end truncate. Body yellowish white. Anterior margin of each segment swollen and with several irregular rows of short, stout, reclinate spines. Head bilobed, with a pair of blunt tubercles, one above the other, on each lobe (Plate 3, fig. 2). Oral hooks two, toothed, dark brown, and strongly recurved ventrally (Plate 2, fig. 1). Segments 5 to 10 with lateral, spinulose, fusiform areas against the anterior margin of the following segment. Segments 6 to 11 with narrow, transverse, smooth, fusiform areas on the somewhat broadened ventral part of the swollen spinulose anterior rings. Amphipneustic. Anterior spiracles probably not functional, indistinct, consisting of a row of six small circular openings. Posterior stigmal plates approximate, situated at the bottom of a deep cavity at the posterior tip of the body. Slits three, subparallel, without button, and chitinous process not completely inclosing them. Ten small tubercles on the edge of the stigmal cavity (Plate 5). Segment 12 with a swollen spinulose area ventrally which is bisected transversely by a smooth area and gives rise to two, large, widely separated tubercles. Length, 12 to 12.5 millimeters; breadth, 3.5 to 4.

Puparium.—Regularly ellipsoidal, chestnut brown to black. Surface finely rugose, with recumbent spines located as in larva. Anterior spiracles not apparent. Posterior stigmal plates not sunken, but otherwise as in larva. Size variable. Average length, 10 millimeters; breadth, 3.

Distinguishing characters.—Screw-worm infestations are usually secondary. The adults are attracted to open wounds and blood, and the larvæ enter the flesh through the broken skin. In a few cases, crushed engorged ticks or drops of blood from tick bites or horsefly bites are the attraction for the screw-worm fly, and myiasis may occur at those points without previous abrasion. Screw worms are often found in feet previously injured by foot maggots. Foot maggots, on the other hand, usually occur as primary pests.

Screw-worm infestations may occur on any part of the body, while foot maggots are apparently confined to the coronary region of the tougher-skinned animals, and have been found as high up the leg as the knee in the tenderer-skinned animals, such as goats. Again, foot maggots appear to be confined to the Artiodactyla, while screw worms attack all mammals.

The larvæ may be easily distinguished by the characters noted in Table 3.

TABLE 3.—*Showing distinguishing larval characters of the screw worm and the foot maggot.*

Character.	Screw worm.	Foot maggot.
Shape	Cylindrical, wedged-shaped when at rest.	Plump, robust, more or less ellipsoidal when at rest.
Surface	Each segment with but a few irregular rows of spines on the anterior half.	Entire surface of each segment with irregular rows of spines.
Posterior spiracles	With a heavy chitinous ring around the slits. Stigmal plates approximate.	Without heavy chitinous ring. Stigmal plates separate.
Anterior spiracles	Indistinct, with six openings.	Conspicuous, with eighteen openings.
Color	Yellow-white.	Grayish white.
Posterior stigmal invagination	Surrounded with ten tubercles.	Surrounded with six tubercles.

SUMMARY

The eggs of the foot maggot are laid on the hairs of the lower extremities of the legs of the host animals. The larvæ work their way down to the skin and attempt to enter the flesh. In the tougher-skinned animals, they are unable to enter at any

place other than the coronary region of the foot. The increase from two to three slits in the posterior stigmal plates of the larva takes place while the larva is buried in the flesh. The injury by the foot maggot is primary, but is often followed by serious secondary infestations or complications. The fully developed larvæ leave the foot and enter the soil for pupation.

Cases of foot-maggot myiasis and observations on animals tend to show that the fly is neither rare nor local. In the past it has evidently been confused with the screw worm. Circumstantial evidence shows that the habits of the host animals have a direct relation to their susceptibility. Seasonal occurrence of the insect is dependent, to some extent, upon the same factors that control its relative abundance on its various hosts.

The host animals appear to be confined to the Bovidæ, or at least to the Artiodactyla. So far only Bovidæ have been definitely proven as hosts.

Symptoms.—A lameness, that varies in degree, is usually the first indication of foot-maggot infestation. The animal is restless and shakes the affected limb. It is often observed raising the leg and licking the infested area. If all four feet are involved the animal will assume a recumbent position at every opportunity.

Numerous small puncture wounds are found in the skin at the coronary band, and in the soft horn at the dorsal border of the horn wall of the large claws. The bulbs of the heels are usually the most heavily infested (Plate 7, figs. 1, 3, and 4). Wounds of the same type are also found at the margins of the small claws. When the larvæ are numerous, the area affected exhibits a honeycomb appearance. These wounds are superficial, and do not extend into the underlying structures. However, they offer an entrance for infection and secondary infestation with screw-worm larvæ (Plate 7, fig. 2). Infection is practically always present in cases of long standing, and then the amount of tissue destruction assumes serious proportions.

As a sequel to the destruction of the coronary band and of the soft horn, many small transverse cracks and crevices are found in the horn wall extending as low as the ground border (Plate 8, figs. 1, 2, 3, 4, and 5). The transverse rings are also distorted.

Prognosis.—Favorable, providing treatment is given early to prevent complications.

RECOMMENDATIONS

Treatment.—From the results observed in the treatment of clinic cases and from the knowledge of the habits of the fly itself, the following treatment is considered most efficient. Clean the affected area with soap and water. To get rid of the fly eggs, closely clip the hair from around the feet. Remove as many of the maggots as possible and apply a chloroform pack for twenty-four hours. This should be followed by heavy applications of pix liquidæ every third day until the lesions heal. The chloroform pack can be dispensed with provided the infestation is of so recent occurrence that the pix liquidæ can be applied directly to the maggots.

Prevention and after treatment.—All cattle, carabaos, and, possibly, goats should be inspected daily, especially during the dry season, to prevent this type of myiasis from spreading throughout the herd, and also to start early treatment of the affected animals. Inspection is not difficult as the condition is easily recognizable. During the dry season it is important that the animals have access to plenty of water, as the mud on their legs makes it difficult for the fly to attach its eggs.

ILLUSTRATIONS

PLATE 1

FIG. 1. Foot maggot, ventral view, × 7.
2. Posterior spiracles, greatly enlarged.
3. An aberrant stigmal plate, greatly enlarged.
4. Foot maggot, dorsal view, × 7.
5. Anterior ventral portion of foot maggot, × 45.
6. A portion of the body surface, showing the reclinate spines, greatly enlarged.
7. Foot maggot, posterior view, × 28.
8. Foot maggot, anterior view, × 28.

PLATE 2

FIG. 1. Cephalopharyngeal skeleton of screw worm.
2. Cephalopharyngeal skeleton of foot maggot.
3. Puparium of foot maggot, × 4.
4. Anterior end of puparium of foot maggot, × 28.
5. Egg of foot maggot, showing "flap," × 50.
6. Egg of foot maggot, × 52.

PLATE 3

FIG. 1. Anterior end of foot maggot, × 45.
2. Anterior end of screw worm, × 45.

PLATE 4

FIG. 1. Posterior end of newly hatched foot maggot, × 45.
2. Posterior end of full-grown foot maggot, × 45.

PLATE 5

Posterior end of screw worm, × 45.

PLATE 6

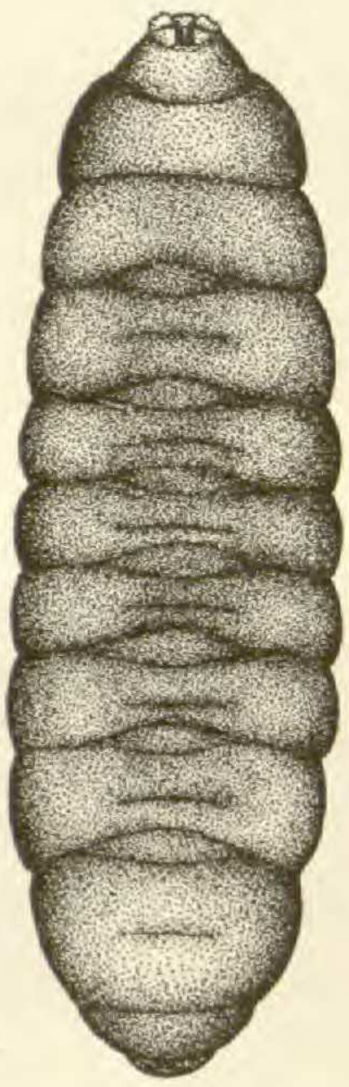
FIG. 1. Foot maggot fly, dorsal view, × 9.
2. Foot-maggot fly, lateral view, × 9.

PLATE 7

FIG. 1. Posterior view of foot of Hereford bull, showing foot-maggot injury.
2. Posterior view of foot of goat, showing screw-worm injuries subsequent to foot-maggot attack.
3. Lateral view of foot of Hereford bull, showing foot-maggot injury.
4. Heel of Hereford bull, showing characteristic perforations of foot maggot.

PLATE 8

FIG. 1. Anterior view of left fore foot of carabao, showing foot-maggot injury.
2. Anterior view of left hind foot of carabao, showing foot-maggot injury.
3. Posterior view of left hind foot of carabao, showing foot-maggot injury to dew claws.
4. Lateral view of left fore foot of carabao, showing foot-maggot injury.
5. Lateral view of right hind foot of carabao, showing foot-maggot injury.



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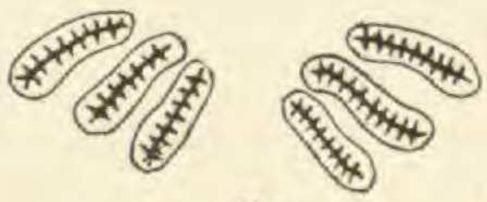

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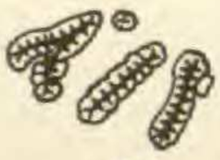

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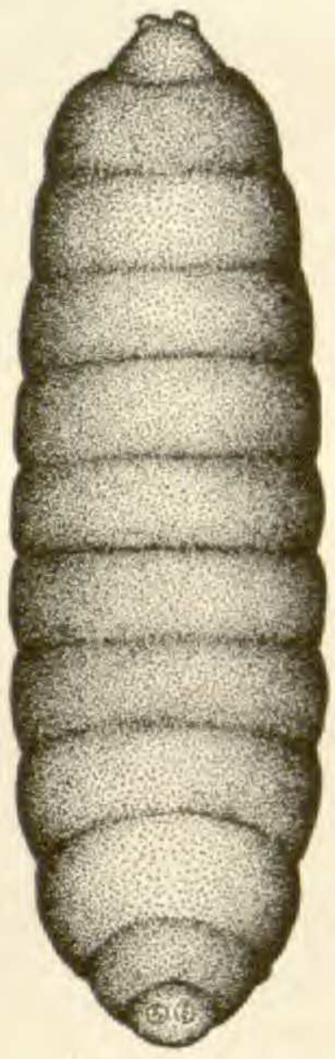

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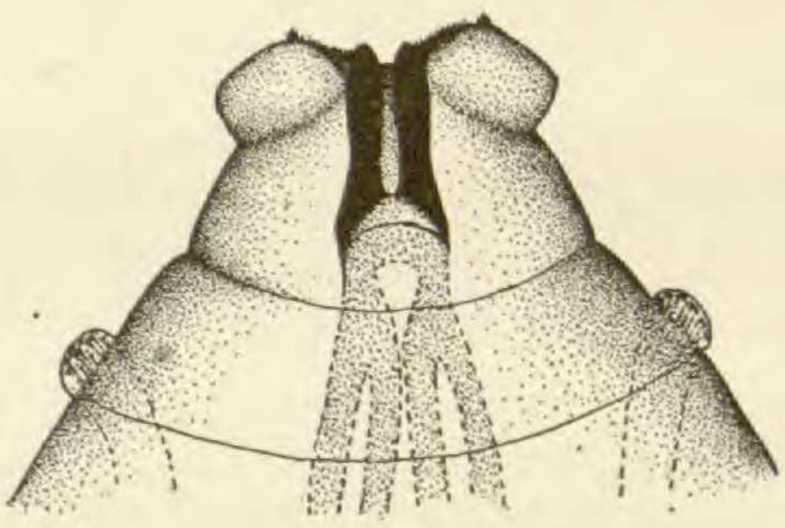

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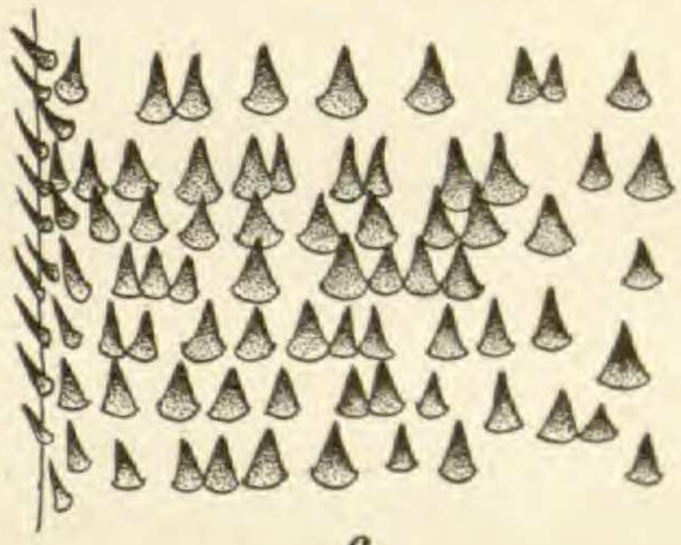

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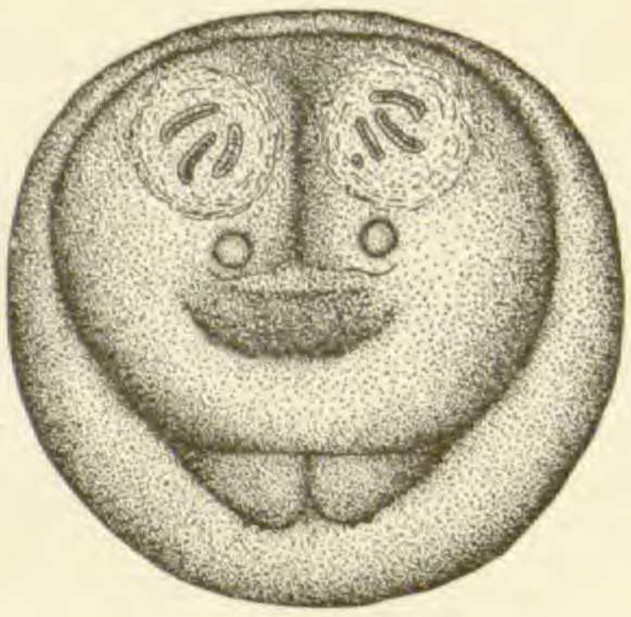

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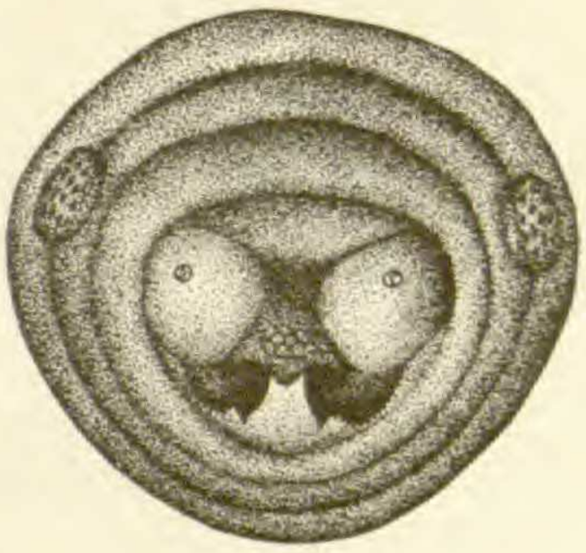

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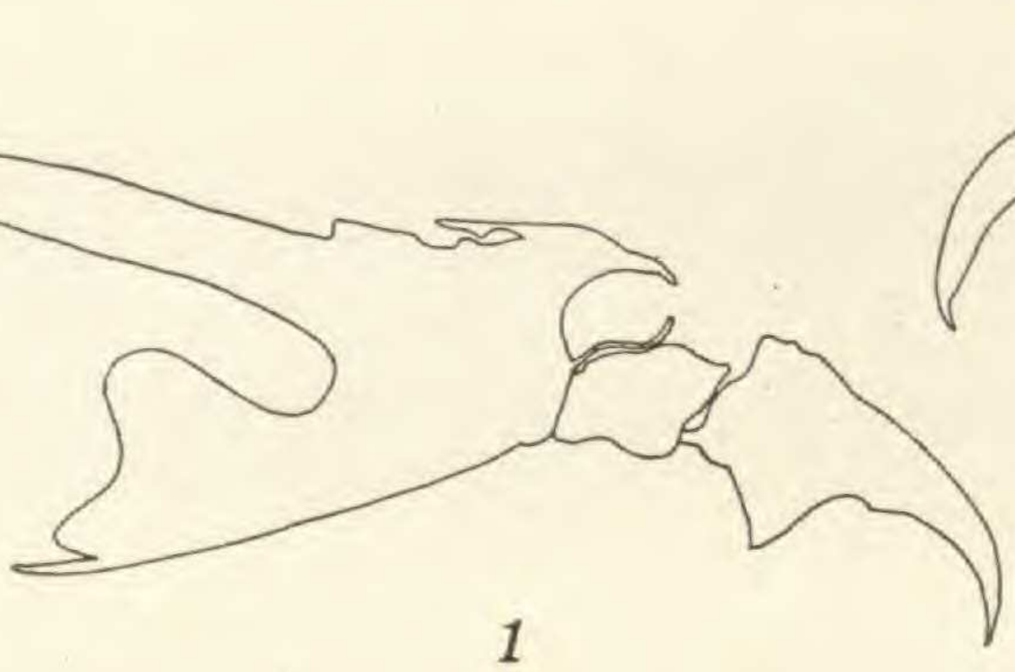

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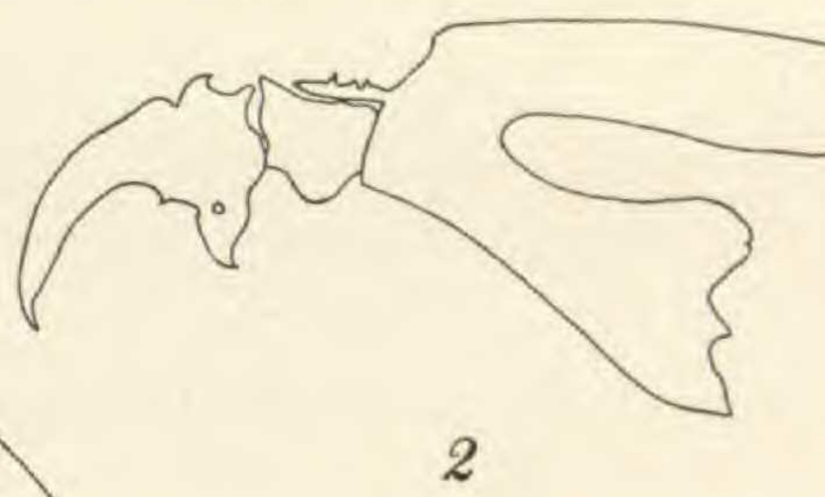

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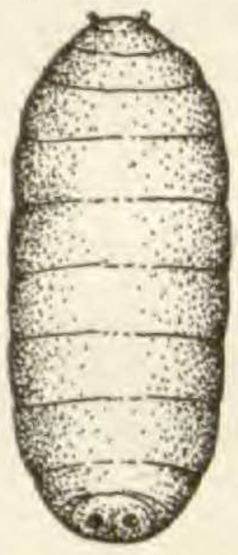

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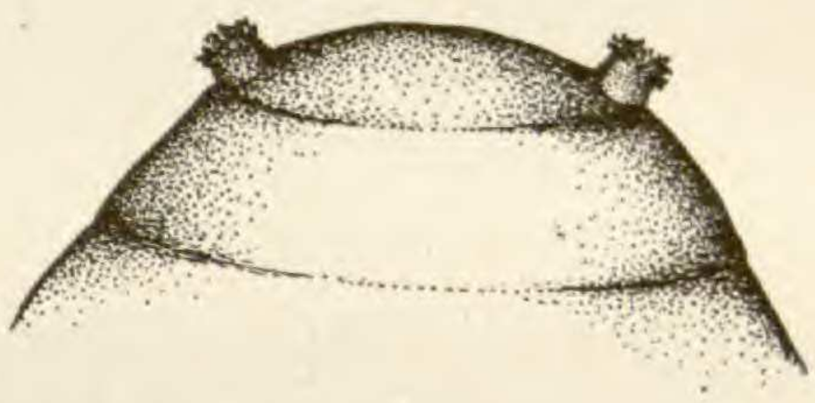

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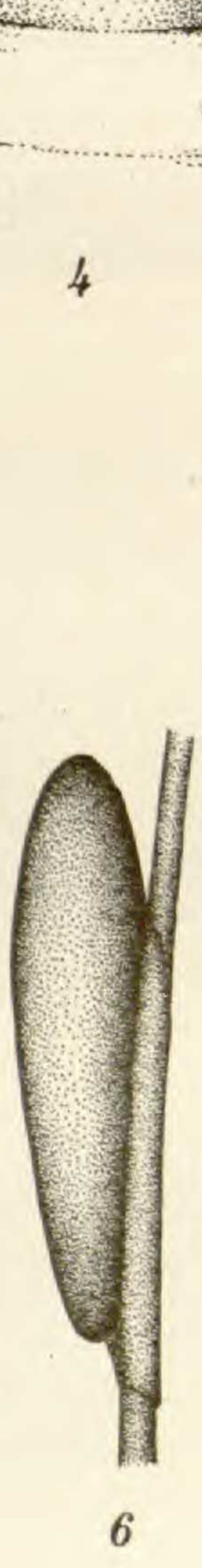

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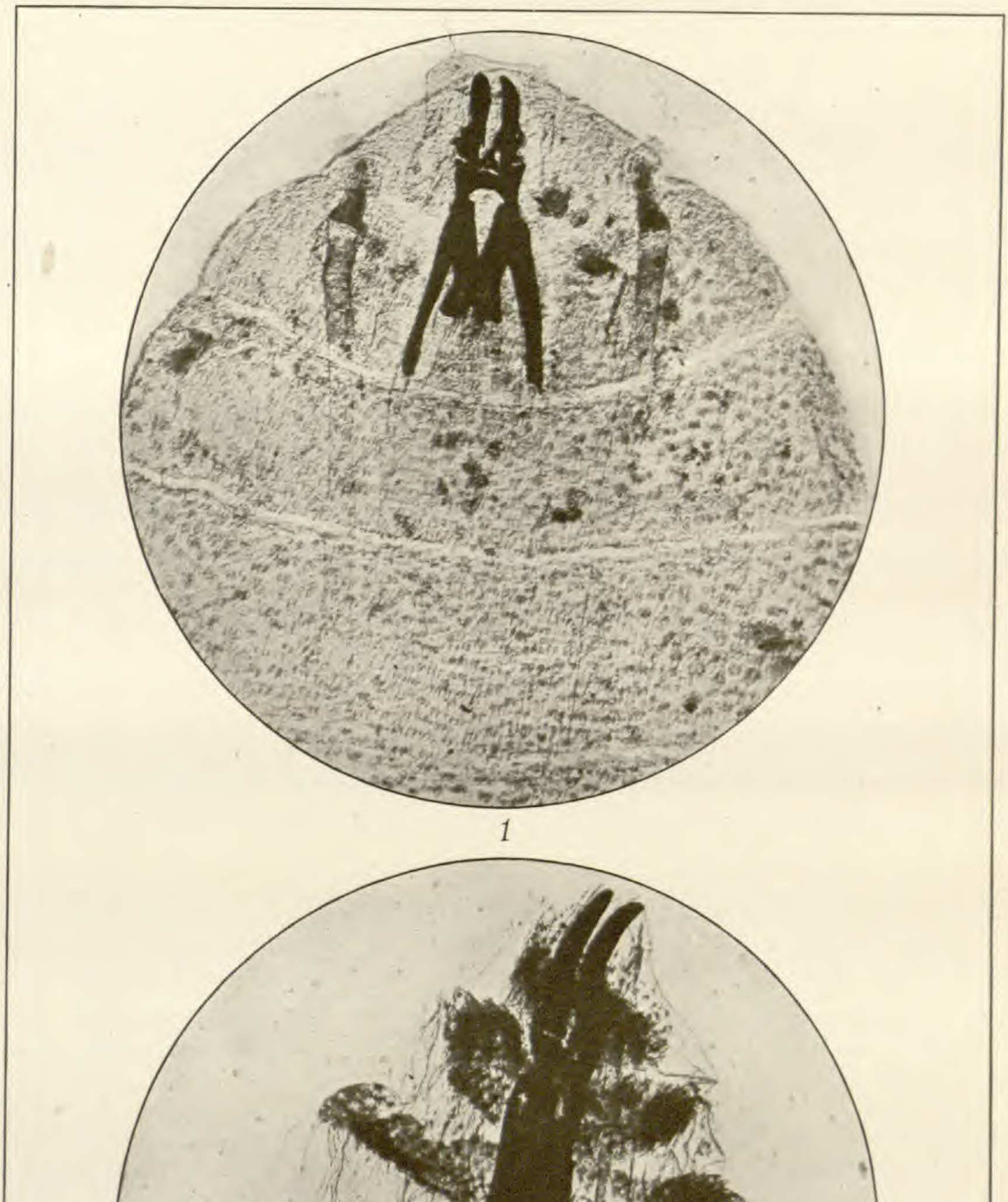

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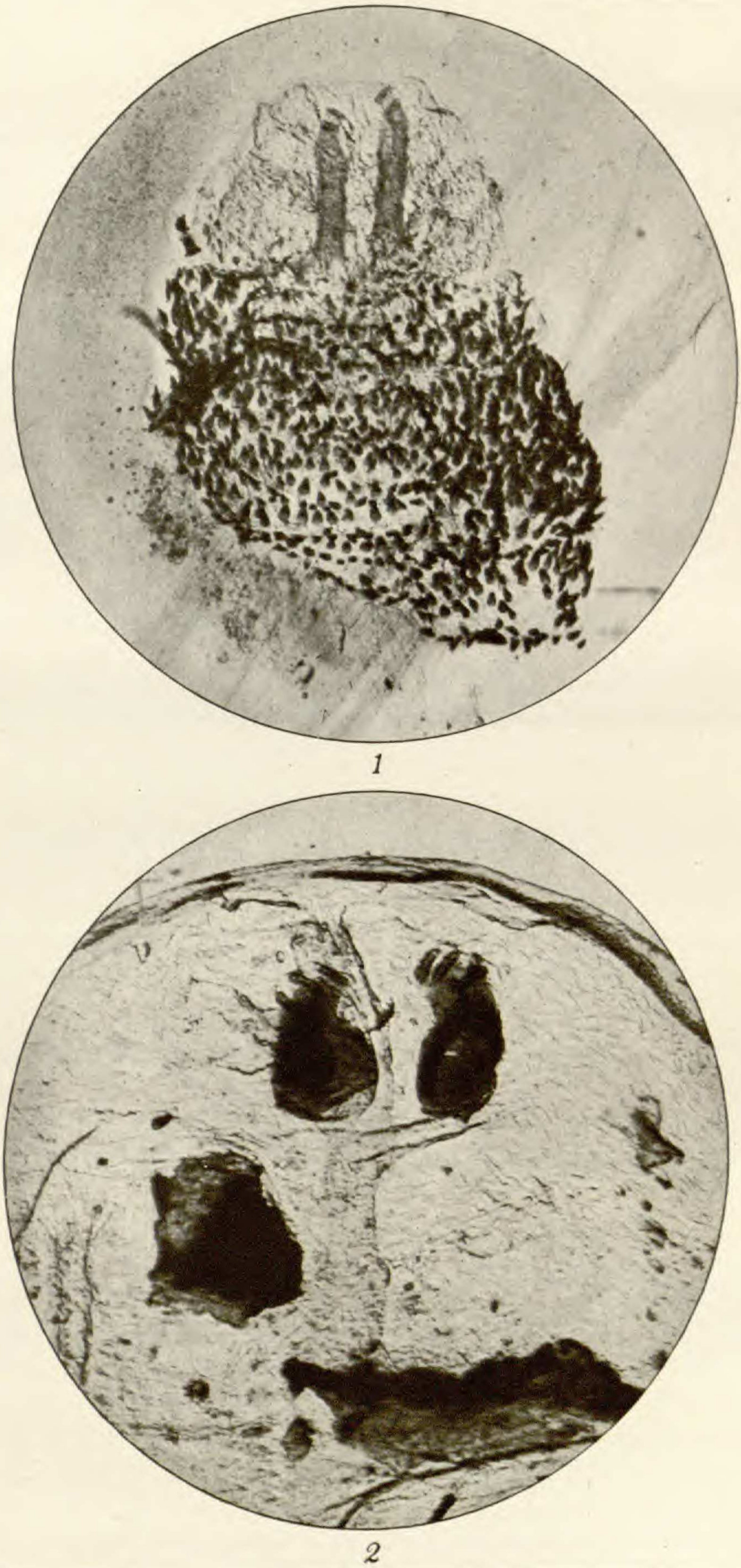

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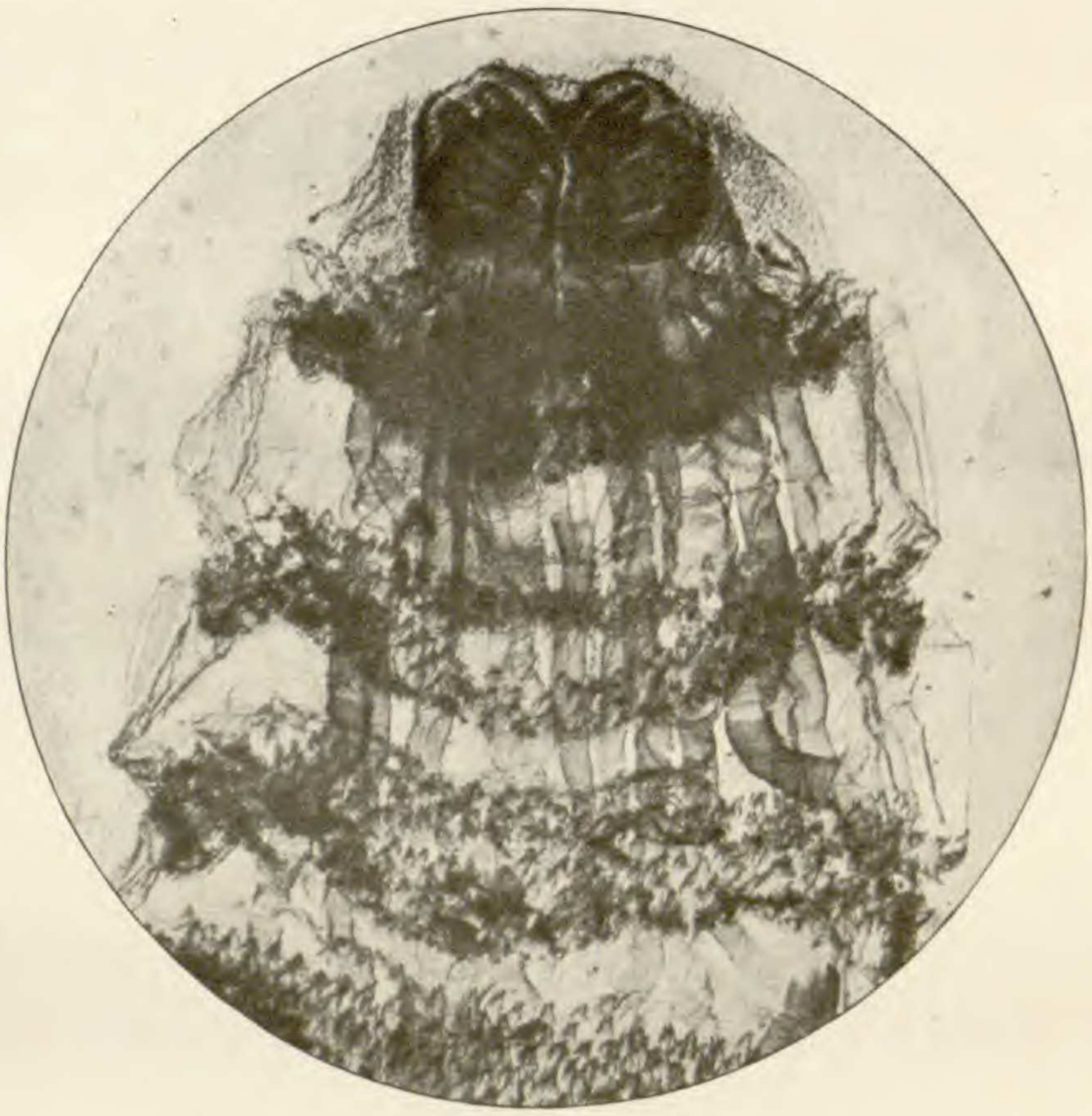

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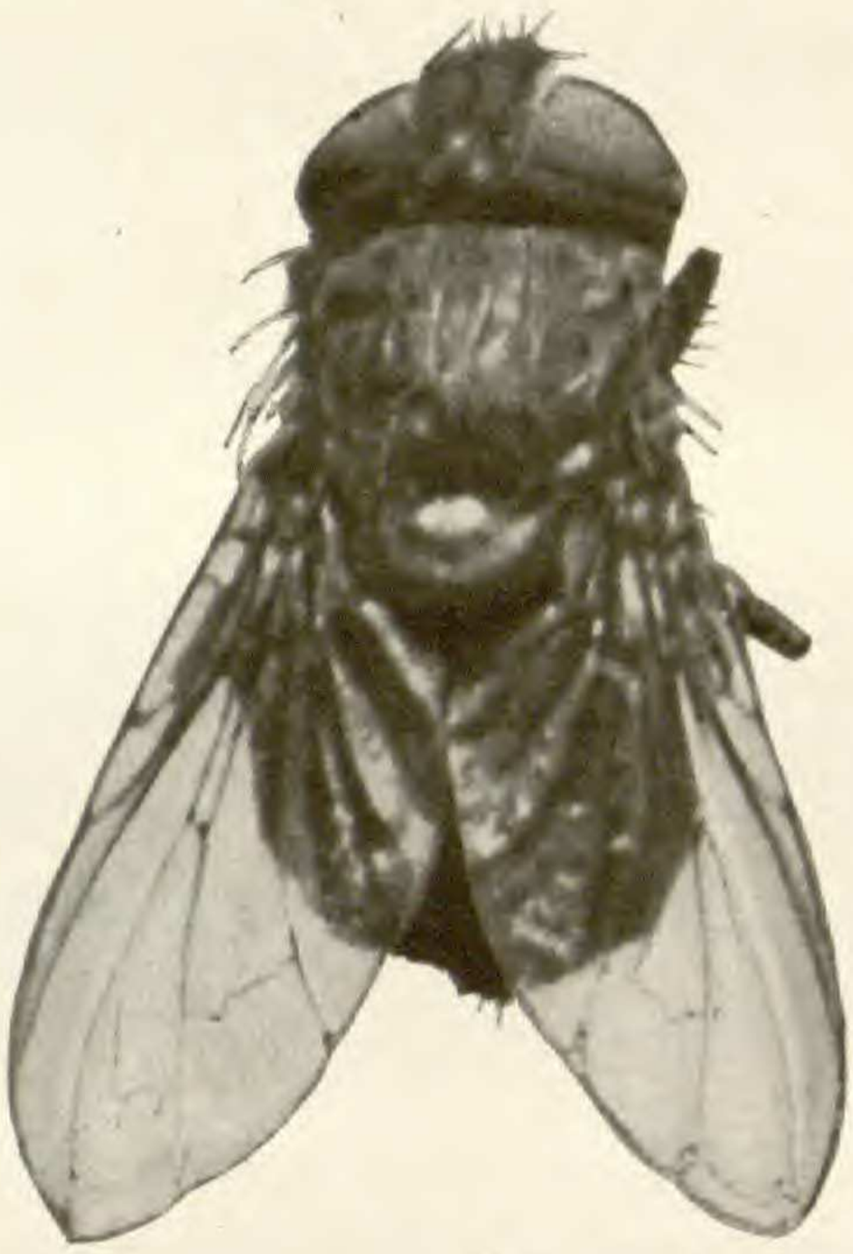

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PLATE 6.

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PLATE 7.

1 2 3 4 5

PLATE 8.